

Fact Sheet on Programmatic Example

(Note: this is just an example of the type of evidenced based or promising practice that may implement all or part of a BSK strategy.)

Strategy to be Addressed:

Meet the health and behavior needs of youth – Expand convenient access to preventive health services in school

Program Name:

School-Based Health Centers (SBHC)

Brief Program Description:

School-based health centers offer students a comprehensive scope of services including asthma care, immunizations, family planning, and mental health counseling. In addition to addressing health care concerns, they also promote good health for a lifetime through good nutrition education, supportive relationships, and reinforcement of positive self-images.

Several community health care partners are part of a system that operates SBHCs—with Public Health—Seattle & King County providing the health care services coordination—at high schools, middle schools and elementary schools in King County, including Group Health, Swedish Medical Center, Neighborcare Health, and Odessa Brown Children's Clinic/Seattle Children's. Currently there are 26 SBHCs in Seattle, 2 in Highline, 1 in Kent, and 3 in Issaquah (providing mental health services only).

Prevention Results Achieved Elsewhere or in K.C. Pilot:

School-based health centers have demonstrated that they attract harder-to-reach populations, especially minorities and males, and that they do a better job at getting them crucial services such as mental health care and high-risk behavior screens. Two studies found adolescents were 10-21 times more likely to come to a SBHC for mental health services than the community health center network or HMO.

A national multi-site study of school-based health centers conducted by Mathematica Policy Research found a significant increase in health care access by students who used school-based health centers: 71% of students reported having a health care visit in past year compared to 59% of students who did not have access to a SBHC.

A study of elementary school-based health centers conducted by Montefiore Medical Center found a reduction in hospitalization and an increase in school attendance among inner-city school children for asthma. Another study on school-based health care's effects on asthma found decreases in hospitalization rates of 75-85% and improvements in the use peak flow meters and inhalers.

A study of SBHC users in Seattle found that those who use the clinic for medical purposes had a significant increase in attendance over nonusers.

Target Population and number of people served:

SBHCs provide over 25,000 health care visits annually to students at high schools, middle schools and elementary schools in King County.

Estimated Cost Savings to Community:

A study by Johns Hopkins University found that school-based health centers reduced inappropriate emergency room use, increased use of primary care, and resulted in fewer hospitalizations among regular users.

A study of Medicaid-enrolled children served by a SBHC in Atlanta, Georgia found significantly lower inpatient, nonemergency department transportation, drug, and emergency department Medicaid expenses as compared to children without a SBHC. In 1996 the total yearly expense per individual for the SBHC was \$898.98, as compared to \$2360.46 for individuals without a SBHC.

Benefits of School-Based Health Centers

Research and evaluations have demonstrated that school-based health centers represent cost-effective investments of public resources.

- A study by Johns Hopkins University found that school-based health centers **reduced inappropriate emergency room use** among regular users of school-based health centers.^{1,2}
- A study of school-based health center costs by Emory University School of Public Health attributed **a reduction in Medicaid expenditures** related to inpatient, drug and emergency department use to use of school-based health centers.³
- School-based health centers have demonstrated that they attract harder-to-reach populations, especially minorities and males, and that they do a better job at getting them crucial services such as mental health care and high-risk behavior screens. Two studies found adolescents were **10-21 times more likely to come to a SBHC for mental health services** than the community health center network or HMO.^{4,5}
- A national multi-site study of school-based health centers conducted by Mathematica Policy Research found a **significant increase in health care access by students who used school-based health centers**: 71% of students reported having a health care visit in past year compared to 59% of students who did not have access to a SBHC.⁶
- A study of elementary school-based health centers conducted by Montefiore Medical Center found a **reduction in hospitalization and an increase in school attendance** among inner-city school children for asthma.⁷ Another study on school-based health care's effects on asthma found decreases in hospitalization rates of 75-85% and improvements in the use peak flow meters and inhalers.⁸
- Adolescents who received counseling services in a school-based health center significantly **decreased their absenteeism and tardiness**, while those not receiving counseling slightly increased their absence and tardiness rates.⁹
- A study of student users of health centers found that **students who reported depression and past suicide attempts were significantly more willing to use the clinic** for counseling services. Those with perceived weight problems reported more willingness to **use a school clinic for nutrition information** than those who did not feel overweight. Sexually active students were willing to **seek information on pregnancy prevention** and to have general disease checks.¹⁰
- Dallas school-based health centers found that medical services helped **decrease absences by 50%** among students who had three or more absences in a six-week period; students who received mental health services had an **85% decline in school discipline referrals**.¹¹

1. Key JD, Washington EC, Hulsay TC. Reduced Emergency Department Utilization Associated with School-Based Clinic Enrollment. *Journal of Adolescent Health*. Apr 2002;30(4):273-278.

2. Santelli J, Kouzis A, Newcomer S. School-Based Health Centers and Adolescent Use of Primary Care and Hospital Care. *Journal of Adolescent Health*. 1996;19:267-275.

3. Adams EK, Johnson V. An Elementary School-Based Health Clinic: Can it Reduce Medicaid Costs? *Pediatrics*. Apr 2000;105(4 Pt 1):780-788.

4. Juszczak L, Melinkovich P, Kaplan D. Use of Health and Mental Health Services by Adolescents Across Multiple Delivery Sites. *Journal of Adolescent Health*. Jun 2003;32(6 Suppl):108-118.

5. Kaplan D, Calonge B, Guemsey B, Hanrahan M. Managed Care and School-based Health Centers: Use of Health Services. *Archives of Pediatric and Adolescent Medicine*. 1998;152:25-33.

6. Kisker EE, Brown RS. Do School-Based Health Centers Improve Adolescents Access to Health Care, Health Status, and Risk-Taking Behavior? *Journal of Adolescent Health*. 1996;18:335-343.

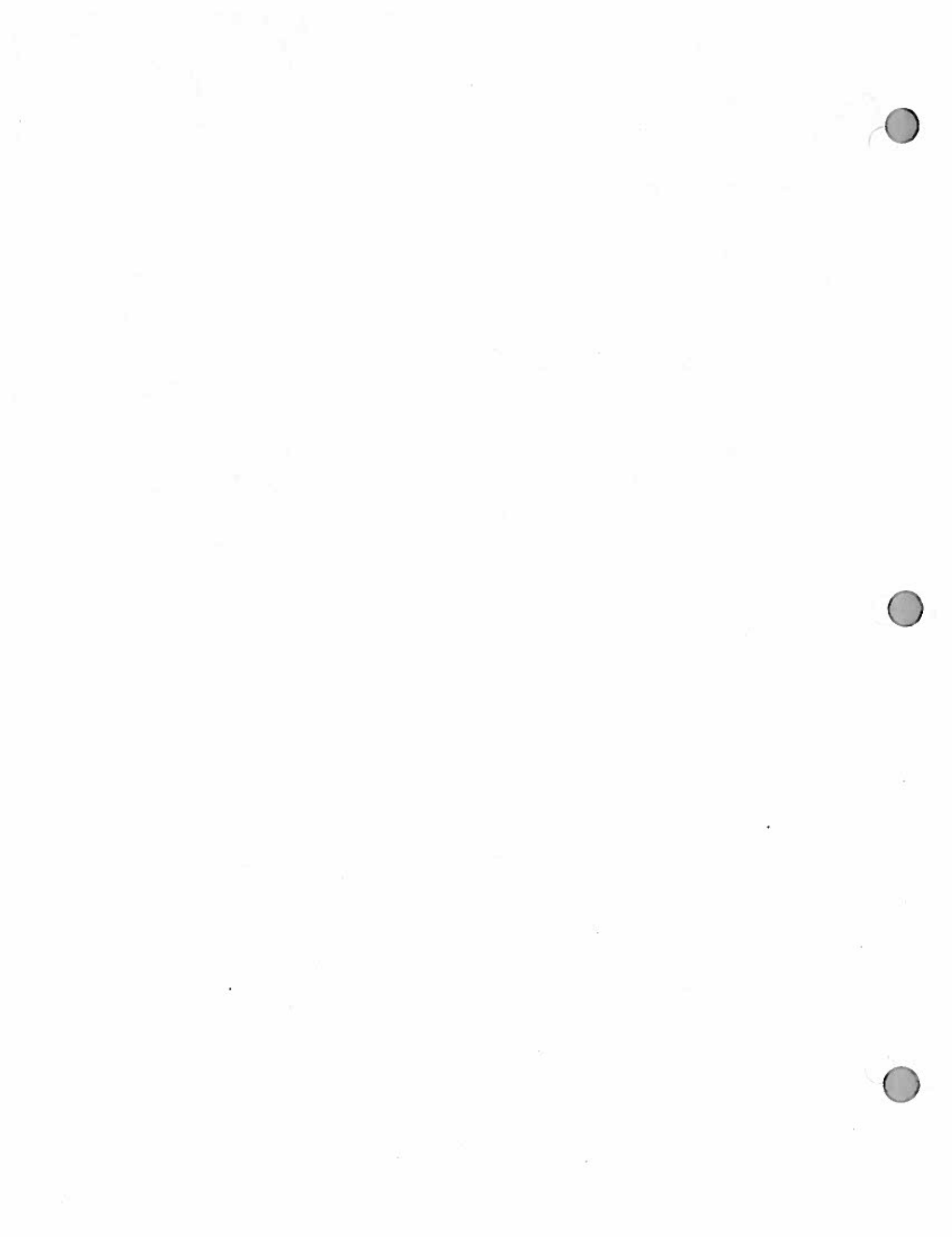
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8. Lurie N, Bauer EJ, Brady C. Asthma Outcomes at an Inner-City School-Based Health Center. *J Sch Health*. Jan 2001;71(1):9-16.

9. Gall G, Pagano ME, Desmond MS, Perrin JM, Murphy JM. Utility of Psychosocial Screening at a School-Based Health Center. *Journal of School Health*. Sep 2000;70(7):292-298.

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Cost-Savings of School-Based Health Centers

Research and evaluations have demonstrated that school-based health centers represent cost-effective investments of public resources:

- A study by Johns Hopkins University found that school-based health centers **reduced inappropriate emergency room use**, increased use of primary care, and resulted in **fewer hospitalizations** among regular users.¹
- A study of Medicaid-enrolled children served by a SBHC in Atlanta, Georgia found **significantly lower inpatient, nonemergency department transportation, drug, and emergency department Medicaid expenses** as compared to children without a SBHC. In 1996 the total yearly expense per individual for the SBHC was \$898.98, as compared to \$2360.46 for individuals without a SBHC.²
- The number of **hospitalizations and emergency department visits decreased for children with SBHCs** in Cincinnati schools (2.4-fold and 33.5% respectively) – with an estimated savings of nearly \$1,000 per child.³
- Students in New York City schools with SBHCs were **less likely to have been hospitalized for asthma** at least once in the past year (10.5%) compared to those in schools without SBHCs (17.1%).⁴
- In South Carolina, prevention-oriented health care provided in a SBHC **decreased emergency department visit rates** by 41% to 57% – 18% greater than the decrease in students who did not use the SBHC.⁵
- Adolescents with access to SBHCs in Denver had **38% - 55% fewer after-hours care (emergent or urgent) visits** than those without school-based health center access.⁶
- Students in Ohio who used an SBHC reported more positive self-perceptions of their health, which correlated with **lower Medicaid costs**. SBHC patients cost Medicaid an average of \$30.40 less than comparable, non-SBHC patients.⁷
- A study that explored the cost-benefit of a nationwide SBHC program to manage childhood asthma **estimated total savings** for opportunity costs of work loss and premature death at \$23.13 billion.⁸

1. Santelli J, Kouzis A, Newcomer S. School-Based Health Centers and Adolescent Use of Primary Care and Hospital Care. *Journal of Adolescent Health*. 1996;19:267-275.

2. Adams EK, Johnson V. An Elementary School-Based Health Clinic: Can it Reduce Medicaid Costs? *Pediatrics*. Apr 2000;105(4 Pt 1):780-788.

3. Guo JJ, Jang R, Keller KN, McCracken AL, Pan W, Cluxton RJ. Impact of School-Based Health Centers on Children with Asthma. *Journal of Adolescent Health*. Oct 2005;37(4):266-274.

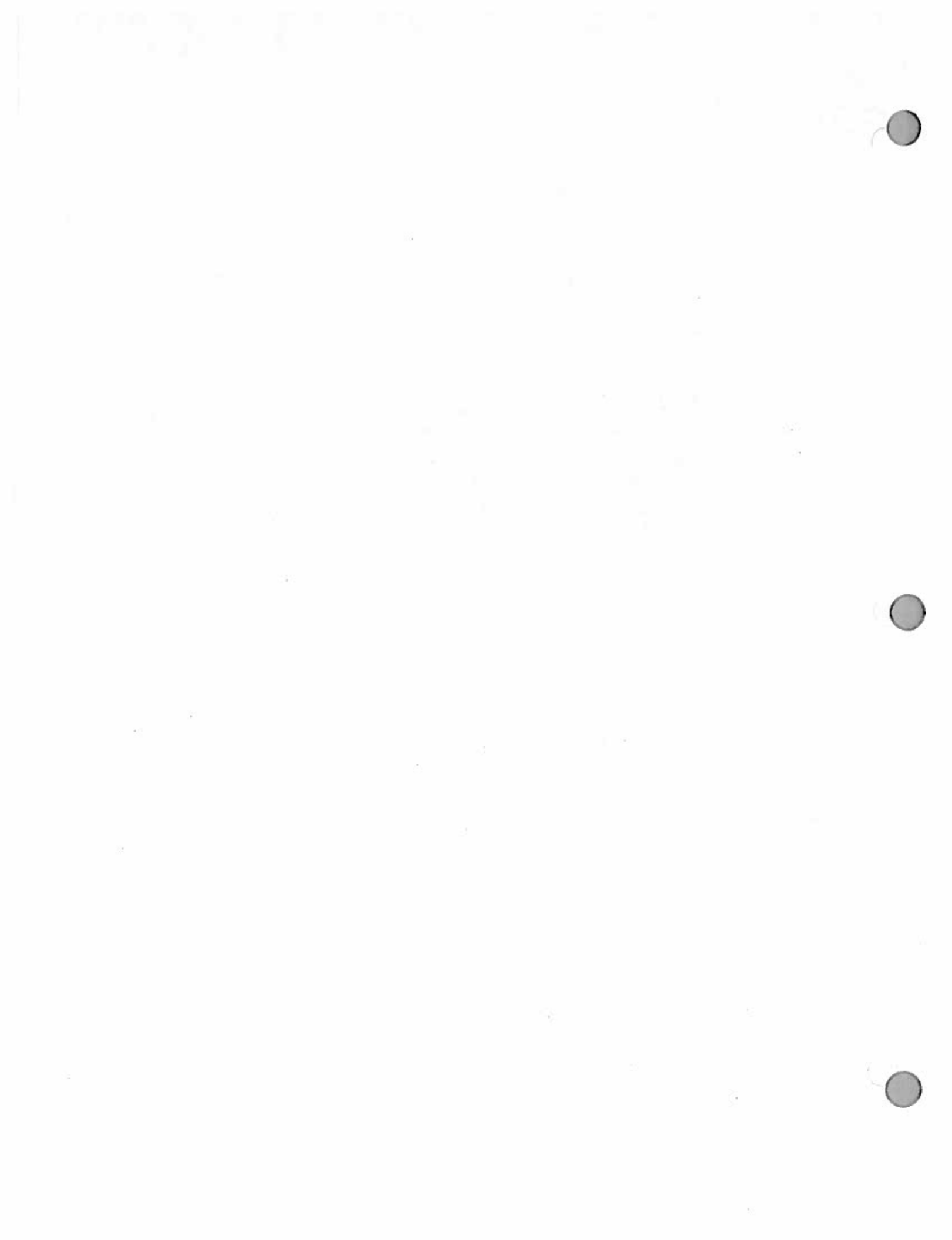
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7. Wade TJ, Guo JJ. Linking Improvements in Health-Related Quality of Life to Reductions in Medicaid Costs Among Students Who Use School-Based Health Centers. *American journal of public health*. Sep 2010;100(9):1611-1616.

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School-Based Health Centers and Academic Success

Poor academic outcomes and high dropout rates are major concerns of educators, policy makers, and parents alike – and poor health severely limits a child's motivation and ability to learn. Recent research confirms that **health disparities affect educational achievement**.¹ Improving students' health is integral to education reform.

Why School-Based Health Centers?

School-Based Health Centers (SBHCs)—the convergence of public health, primary care, and mental health—provide an optimal setting to **foster learning readiness and academic achievement** while giving children the resources they need to improve their health.

The Facts:

- High school SBHC users in one 2000 study had a **50% decrease in absenteeism** and **25% decrease in tardiness** two months after receiving school-based mental health and counseling.²
- A study of SBHC users in Seattle found that those who use the clinic for medical purposes had a **significant increase in attendance** over nonusers.³
- A 2007 study found that SBHC users for mental health purposes **increased their Grade Point Averages** over time compared to nonusers.³
- African-American male SBHC users were **three times more likely to stay in school** than their peers who did not use the SBHC.⁴
- Students, teachers, and parents who have a SBHC **rated academic expectations, school engagement, and safety and respect significantly higher** than in schools without a SBHC.⁵
- SBHCs in The Bronx, NY **reduced hospitalization and increased school attendance among school children with asthma**.⁶
- A quasi-experimental study in New York observed that students not enrolled in a SBHC lost three times as much seat time as students enrolled in a SBHC.⁷

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2. Gall G, Pagano ME, Desmond MS, Perrin JM, Murphy JM. Utility of Psychosocial Screening at a School-Based Health Center. *Journal of School Health*. Sep 2000;70(7):292-298.

3. Walker SC, Kerns SE, Lyon AR, Bruns EJ, Cosgrove TJ. Impact of School-Based Health Center Use on Academic Outcomes. *The Journal of adolescent health: official publication of the Society for Adolescent Medicine*. Mar 2010;46(3):251-257.

4. McCord MT, Klein JD, Foy JM, Fothergill K. School-Based Clinic Use and School Performance. *Journal of Adolescent Health*. 1993;14(2):91-98.

5. Strolin-Goltzman J. The Relationship Between School-Based Health Centers and the Learning Environment. *Journal of School Health*. 2010;80(3):153-159.

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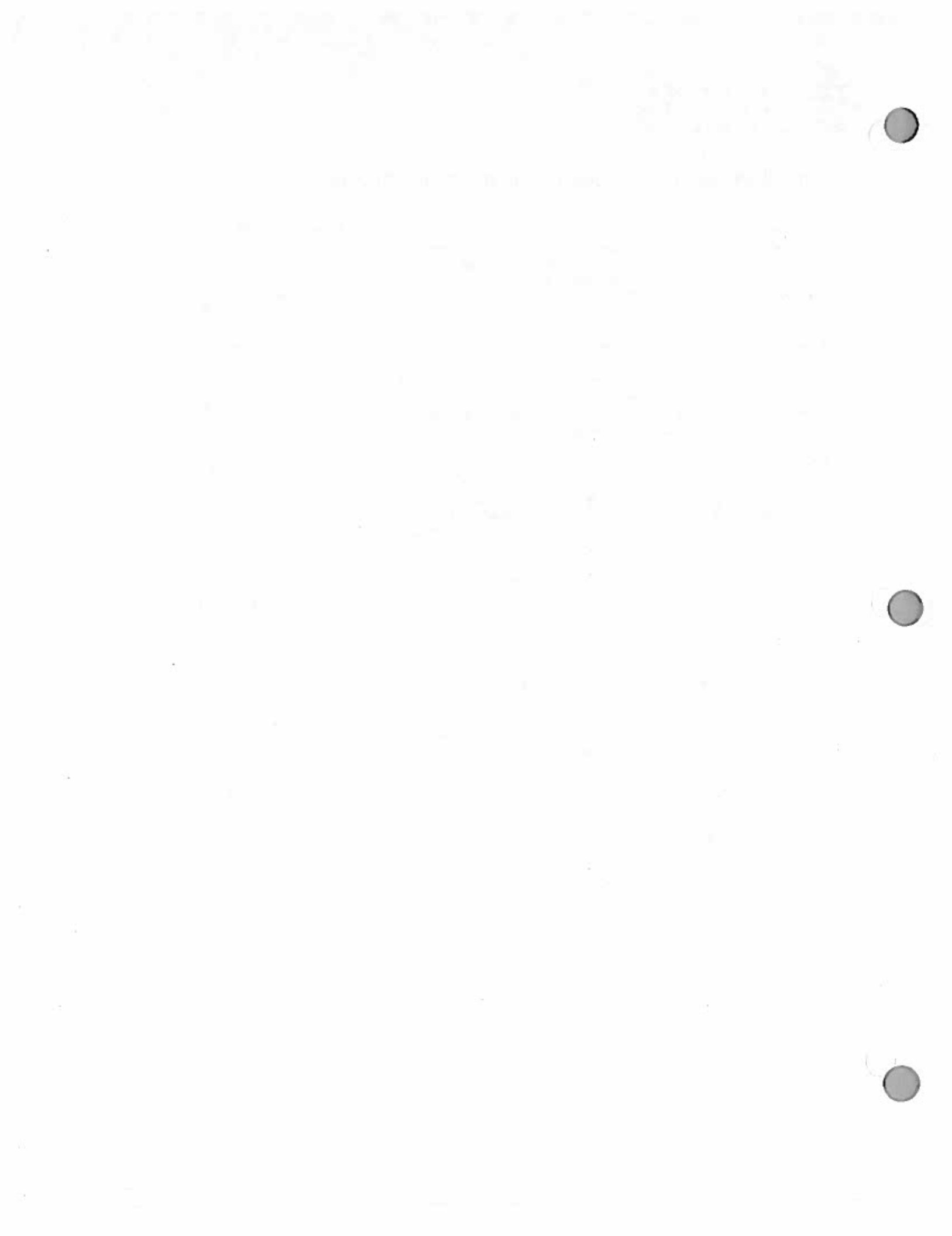


Table 1. Gender, Race, and Insurance Status Distribution for Adolescents by Group and Year (n = 451 users)*

| | Year 1 (n = 270 users) | | | | Year 2 (n = 281 users) | | | | Year 3 (n = 281 users) | | | |
|------------------|--------------------------|--------------------------|---------------------------|-----|---------------------------|--------------------------|---------------------------|------|---------------------------|--------------------------|---------------------------|-----|
| | Group 1 n = 86 (%) | Group 2 n = 44 (%) | Group 3 n = 140 (%) | p | Group 1 n = 101 (%) | Group 2 n = 59 (%) | Group 3 n = 121 (%) | p | Group 1 n = 114 (%) | Group 2 n = 62 (%) | Group 3 n = 105 (%) | p |
| Gender | | | | | | | | | | | | |
| Female | 61 (71) | 26 (59) | 95 (68) | .39 | 66 (65) | 31 (53) | 88 (73) | .03 | 69 (61) | 36 (58) | 72 (69) | .31 |
| Male | 25 (29) | 18 (41) | 45 (32) | | 35 (35) | 28 (48) | 33 (27) | | 45 (39) | 26 (42) | 33 (31) | |
| Race | | | | | | | | | | | | |
| Hispanic | 57 (66) | 31 (70) | 88 (63) | | 75 (74) | 47 (80) | 82 (68) | | 78 (68) | 50 (81) | 72 (69) | |
| African American | 18 (21) | 6 (14) | 27 (19) | | 15 (15) | 5 (9) | 19 (16) | | 18 (16) | 5 (8) | 14 (13) | |
| Whites and other | 11 (13) | 7 (16) | 25 (18) | .64 | 11 (11) | 7 (12) | 20 (16) | .47 | 18 (16) | 7 (11) | 19 (18) | .35 |
| Insurance | | | | | | | | | | | | |
| Self-pay | 64 (74) | 29 (66) | 116 (83) | | 82 (81) | 33 (56) | 97 (80) | | 91 (80) | 39 (63) | 82 (78) | |
| Medicaid | 22 (26) | 15 (34) | 24 (17) | .05 | 19 (19) | 26 (44) | 24 (20) | .001 | 23 (20) | 23 (37) | 23 (22) | .03 |

* Group 1, attended a school with a SBHC but did not use it; Group 2, did not attend a school with a SBHC; Group 3, attended a school with a SBHC and used it. SBHC indicates school-based health center. Percentages do not always equal 100 because of rounding.

compared. Visit data by site where the service was provided was also compared. To account for misclassification based on the mobility of the sample, data were analyzed on a yearly basis as well as for the entire study period. Risk factors in the data set were collapsed into four groups based on type of risk. A grouping of contributing factors was labeled substance use and included those visits at which a risk of tobacco, alcohol, or drug use was identified. Another grouping included risks labeled sexually active, sexuality, pregnancy, and sexually transmitted disease risk and changed to reproductive health risk. Behavioral health risk included: eating disorder, family relationship problem, student with a child, peer difficulty, school problems, vocational problems, emotional problems, and suicidal ideation risk as well as an assessed need for mental health services. The final risk factor group became injury risk and included seat belt use, violence, and abuse risk. A single adolescent could be identified with multiple risks at different visits or with multiple risks at the same visit. The analysis used descriptive and inferential statistics to answer the research questions. Univariate and bivariate indicators of use were analyzed. The significance of the relationship between dependent and independent variables was tested with Chi-square tests for categorical variables. Contingency tables were constructed to describe the frequencies of user characteristics and utilization.

Results

Population Characteristics

Table 1 presents gender, race, and insurance status information for adolescents in the sample by group

and year. Of the 451 students, 270 or 60% of students used services in Year 1, 281 (62%) in Year 2, and 281 (62%) in Year 3. We found a significant ($p < .05$) difference in gender in the groups in Year 2 that may represent a random fluctuation in the data. Significant differences were also observed in all years in the distribution of insurance status (Medicaid vs. self-pay) and may reflect access issues in the CHN or differences in Medicaid eligibility of the population served at the CHN and SBHC sites. The 451 students who met criteria for inclusion were predominantly female (61.6%) and Hispanic (67.2%). Mean age of users in Year 1 was 16.7 years. Mean age in Years 2 and 3 was comparable at 16.5 and 15.7 years, respectively.

Visit Rates

Of 3469 visits to SBHCs and the CHN, 1953 (56%) were made by adolescents in Group 3, those who used the SBHCs. Group 3 had the highest reported visits rates, an average of 5.3 visits per year (median number of visits = 4). Groups 1 and 2, those accessing care only at CHN facilities, had visits rates averaging 3.3 and 3.1 visits per year, respectively. However, when prenatal care visits were removed from the calculation, visit rates dropped to 2.6 and 2.7 visits per year for Groups 1 and 2, respectively. There were 53 users who made 20 or more visits in the 38 months covered in the data set. These users were predominately female (83%). The majority (65.7%) of visits made by more frequent users were made to SBHCs and were made for mental health reasons (64.7%).

Table 2. Reason for Seeking Care by Site, SBHC or CHN (n = 3469 visits)*

| Reason for Seeking Care | SBHC Visits n = 1953 (%) | CHN Visits n = 1516 (%) | p | Odds Ratio | 95% CI |
|-------------------------|-----------------------------|----------------------------|-------|---------------|-------------|
| Health care maintenance | 152 (8) | 78 (5) | .002 | 1.56 | 1.17-2.06 |
| Reproductive health | 295 (15) | 632 (42) | <.001 | 0.25 | 0.21-0.29 |
| Mental health | 667 (35) | 38 (3) | <.001 | 20.63 | 14.76-28.86 |
| Follow-up | 220 (11) | 146 (10) | .120 | 1.19 | 0.96-1.49 |
| Acute care | 609 (31) | 622 (41) | <.001 | 0.65 | 0.57-0.75 |

*SBHC indicates school-based health center, CHN, community health network; CI confidence interval.
Percentages do not always equal 100 because of rounding.

Visit rates for minority youth were highest in Group 3 (SBHC users), at times more than double the rates for visits by adolescents in Groups 1 and 2. Adolescents who were members of minority groups consistently made more visits per user per year than adolescents who were not members of minority groups. When yearly visit rates were calculated for adolescents who exclusively visited one site (SBHC or CHN) during the 38-month study period, the difference in visit rates by race for this subset of the sample are more pronounced. Hispanic users made an average of 6.6 visits to SBHCs, and 3.45 to CHN facilities. African-American adolescents made an average of 10.6 and 3.4 visits to SBHCs and CHN sites, respectively. Whites and others made 8.8 visits to SBHCs and 2.4 visits to CHN sites.

Males made a minimum of one more visit a year and a maximum of four more visits a year at SBHCs than at CHN facilities. The 228 males in all groups made a total of 885 visits. Visit rates by group for each year were quite variable: 0.53, 2.2, and 2.3 visits per year in Group 1 (access to a SBHC and not using it). They were more consistent in Group 2 (control group) and were 2.4, 2.3, and 2.3 visits per year. In Group 3, the male SBHC users systematically demonstrated the highest visit rates at 4.0, 3.7, and 6.0 visits per year.

Reason for Visit and Diagnosis

Visits to SBHCs were primarily for medical (66%, $p < .001$) and mental health services (34%, $p < .001$). Visits at CHN sites were 97% medical ($p < .001$) medical. Table 2 presents the frequency of seeking care for health care maintenance, reproductive health, mental health, follow-up for an existing problem, and acute care by site of care, SBHC, or CHN. Follow-up visits were initiated by the provider for ongoing care of an existing problem or for laboratory tests. Acute care visits were initiated by the adolescent for a new or recurring problem. Visits by

adolescents were 1.6 times more likely to be initiated for health maintenance reasons at the SBHC than at CHN facilities. CHN visits made by Groups 1 and 2 were 75% more likely to have been initiated for reproductive health reasons and 35% more likely to be initiated for acute care. The association between reason for visit and site of care was not significant when follow-up for a problem was the reason for the visit. The primary reason for a visit was reproductive health for African-American adolescents in Groups 1 (43%) and 2 (61%) and mental health in Group 3 (33%). Hispanic students sought care for reproductive health most often in Group 1 (45%), acute care in Group 2 (47%), and mental health in Group 3 (36%). For Whites and others, the primary reason for seeking care was acute care 50% of the time in Groups 1 and 2 and 41% of the time in Group 3. Reason for seeking care for students with Medicaid in Groups 1 (49%) and 2 (55%) was most likely to be for reproductive health service, and for those in Group 3 (45%) it was mental health.

Large differences existed in the percentage of those who sought mental health services by site. These differences were consistent from year to year. Seventeen percent of all users in the sample accessed mental health services at some point in the study period. Visits by adolescents in Group 3 (SBHC users) were more likely to be for mental health services and accounted for 97% of utilization of these services. Within Group 3, 26% accessed mental health services, as opposed to 3% of those in Groups 1 and 2 ($p < .001$). No statistical differences were found in utilization of mental health services based on race. In Group 3, mental health visits accounted for 45% of all visits for students with Medicaid and 30% of visits for uninsured students ($p < .001$). Males were 45 times more likely ($p < .001$; 95% CI, 21.09-98.02) to have a mental health visit at the SBHC than at CHN facilities.

The reason adolescents seek care may differ from the diagnoses providers generate in a visit. There

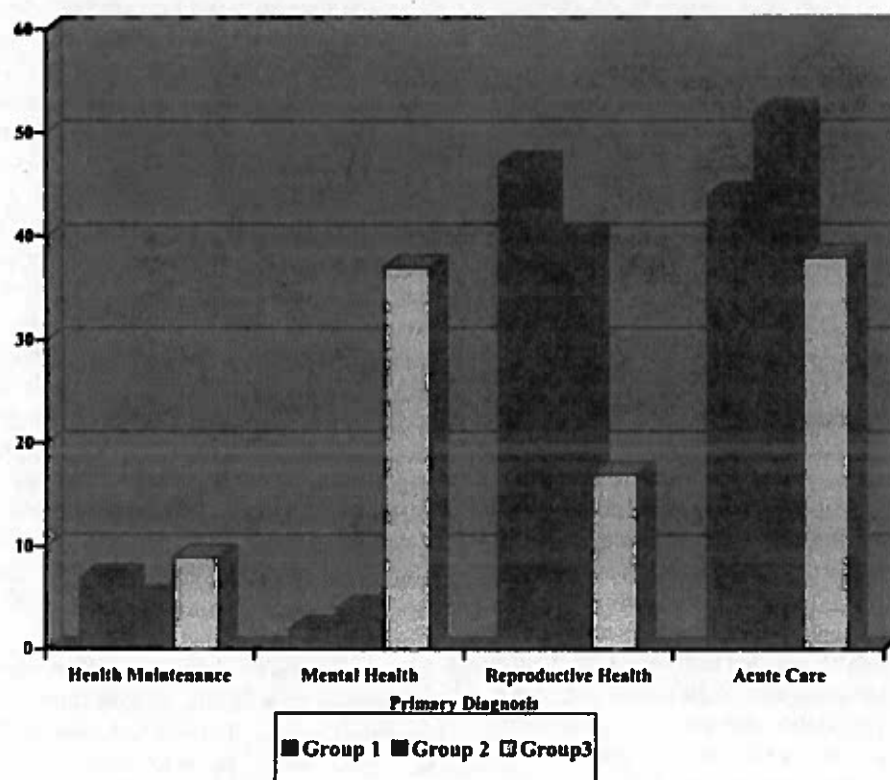


Figure 1. Frequency of primary diagnosis by group ($n = 3469$ visits).

were not large inconsistencies in the reason for seeking care and the diagnoses generated in this study. Figure 1 illustrates the frequency of primary diagnoses generated for each visit for Groups 1, 2, and 3. Because up to four diagnoses could be collected for each visit, it was possible that the provider's choice of primary diagnoses might not reflect the true frequency of problems identified at a visit. The relationship between all (primary through quaternary) diagnoses ($n = 3834$) generated for visits and site of visit was examined and no differences were noted.

Risk Factors

All risk factors were more frequently identified in the SBHC group. Table 3 summarizes the frequency of risk factor identification over 38 months of visits. The order of the frequency in which they were identified is: behavioral health risk, reproductive health risk, injury risk, and substance abuse risk. The most frequently identified risk factor outside of the SBHC group was reproductive health risk in the visits (8%) made by the group with access to the SBHC but not using it. The same risk was identified in 29% of visits

made by the SBHC group. All differences in analysis group and risk factor identification were significant.

Urgent Care

The analysis attempted to determine how service delivery site, a SBHC compared with a CHN, influenced urgent and emergent care use in the public health system. There were 381 visits in the sample to departments coded as emergency care or urgent care. All but one of the visits was for medical reasons. The most common reasons for urgent care visits included

Table 3. Frequency of Risk Factors Identified for Three Groups Based on SBHC Use and Access ($n = 3469$ visits)

| Risk Factor Identified | Group 1, $n = 1003$ (%) | Group 2, $n = 513$ (%) | Group 3, $n = 1953$ (%) |
|------------------------|----------------------------|---------------------------|----------------------------|
| Substance abuse | 28 (3) | 14 (3) | 139 (7) |
| Reproductive health | 82 (8) | 18 (4) | 264 (14) |
| Behavioral health | 58 (6) | 18 (4) | 568 (29) |
| Injury | 41 (4) | 6 (1) | 252 (13) |

* Group 1, attended a school with a SBHC but did not use it; Group 2, did not attend a school with a SBHC; Group 3, attended a school with a SBHC and used it.

illness and somatic complaints (43%) and accidents and injuries (37%). When urgent care use in the system was examined on the basis of whether or not that user had also used an SBHC, adolescents who never used the SBHC were four times more likely ($p < .001$; CI, 3.44–5.47) to access urgent or emergent care. Adolescents who never used CHN facilities during the study period were omitted from this part of the analysis.

Discussion

The purpose of this study was to compare users and utilization of health services in a SBHC to other delivery sites, specifically a public community health center network. This study adds to the limited body of knowledge about SBHCs as they compare with other service delivery sites for adolescents. Few studies have compared utilization patterns of adolescents using school-based health services to adolescents using other health service delivery sites in the same community. Kaplan and colleagues [17] compared utilization of health services of adolescents belonging to a local HMO who attended schools with health centers and schools without health centers. The comparison was based on data extracted from medical records of students. Students' utilization patterns were examined both within the managed care facility and within the SBHC. The study presented in this paper was modeled after the study done by Kaplan. These data were collected from the same SBHCs over approximately the same period of time. Whereas the earlier study examined utilization patterns of a commercially insured population, this study examines utilization in a predominantly uninsured and publicly insured population registered in public community health center network. Both studies are noteworthy in that they attempt to control for self-selection effects common in many SBHC studies by adding a control group. Together, these two studies strengthen the findings each attributes to SBHCs and support the definition of the unique contribution of the SBHC model to the health and mental health of adolescents.

This study provides support for SBHC's ability to attract harder-to-reach populations and to increase use of crucial services that are used less frequently in other settings. SBHCs in this study are particularly strong in improving use of services by minority youth and males. Both of these groups have traditionally been less frequent users of health services. Annual visit rates for African-American and His-

panic adolescents have been reported to be as low as 1.8 and 1.7 visits, respectively, per year with their white peers reporting 2.6 visits per year from the same data [2]. Although there was variability in visit rates, and rates were heavily influenced by more frequent users in some years, in this study adolescents who were members of minority groups made more visits per user per year in SBHCs than adolescents who were not members of minority groups. Non-white adolescents have also been reported as more likely to miss needed care than white adolescents [18]. Racial differences in health service use among adolescents have been postulated to be owing to: differences in health beliefs such as those found among adults from minority groups, discrimination in institutional access, and practitioner attitudes [2]. SBHCs, which have demonstrated their ability to provide comprehensive health services to underserved adolescents [15,19], may be addressing factors impeding utilization to which adolescents from minority groups are most sensitive.

Males in this study also significantly increased use with access to a SBHC. Adolescent males have been identified as less likely to have had a check-up in the past year, less likely to have a usual source of primary care, and more likely to report using the emergency room as a usual source of care [18]. The SBHC model has demonstrated, in the past, the ability to connect to this population [19]. Results of this study demonstrate higher utilization and provide evidence that the model can increase utilization of mental health services by males.

Another important finding of this study is related to the type of service used, medical or mental health. Mental health services were available at all sites in the study but were used more frequently in the school-based health centers. The high probability of using mental health services in the SBHC group in this study does support the provision of mental health services that are easily accessed and responsive to needs of adolescents. Adolescents identified with a problem are likely to receive services in the SBHC environment. Although CHN facilities had such services available, they required additional appointments in other departments and waits for visits. Adolescents were 21 times more likely to come for mental health visits at SBHCs than at CHN facilities. Improved identification of students in need, enhanced availability, and practice and personality characteristics predominant in SBHC models may all have contributed to this major difference in use of mental health services.

Whereas provision of mental health services is a strength of the SBHC model in this study, both reproductive health and acute care are more frequently accessed in CHN facilities. The picture that emerges from the data is that adolescents with access to a SBHC use those services chiefly for mental health first and acute care second. Adolescents who do not use a SBHC primarily seek and receive care for acute problems and reproductive health. These data are consistent with previous reports of SBHCs experiences [17,19]. Differences in reproductive health visits by site of service can be accounted for by two factors. First, the SBHCs in this community have had restrictions since their inception, on provision of reproductive health services on school grounds. Students can access pregnancy testing, sexually transmitted disease testing, and family planning examinations at SBHCs with parental consent. The centers are prohibited from prescribing and dispensing contraceptives on site. Second, the largest portion of visits to CHN facilities for reproductive health services is for prenatal care. None of the SBHCs provide this specialty service onsite. Students using SBHCs are limited in their access to reproductive health services by parental consent, restriction on prescribing and dispensing contraceptives on site, and availability of prenatal care services. None of these limitations are in place at CHN facilities.

Visits for health care maintenance (immunizations, physical examinations) also differed based on where care was received. Health maintenance as a reason for a visit and as a diagnosis generated was the only category that was poorly addressed across all groups. Several current recommendations for routine health maintenance and assessment during the adolescent years are for an annual visit with or without a physical examination [20]. The relatively low reported frequency of such visits in SBHCs is a concern because center providers frequently use their ability to provide health promotion, prevention, and health maintenance services as a selling point for the model. In reality what appears to happen is that centers' medical and nursing staff members are busy responding to acute care demands of students. There is evidence that the SBHC model, if focused on health care maintenance, can achieve results [21]. The likelihood of a health care maintenance visit at a SBHC was greater than at CHN facilities, demonstrating that in this study SBHCs were well situated to improve on this aspect of service provision.

Emergency and urgent care use by all segments of the population is a concern. Not only is it more expensive than primary care, but it also falls short of

the ideal relationship between practitioners and clients. Data for this study suggest that urgent care use by adolescents who did not have access or did not use a school-based health center ever in the study period was more than four times more likely to happen than for those who at some point had access and used a school-based health center. There are several difficulties with this portion of the analysis. The comparison of groups of students on urgent and emergent care use does not directly measure the effect of SBHCs on urgent and emergent care use in all cases. In the group with access who did not use the SBHC, lower urgent care use could be a reflection of availability of SBHCs in urgent situations for nonregistered students (nonusers). This is a common arrangement in schools with centers. There could be some influence of SBHCs operating in the group who used both CHN facilities and SBHCs during the study period accounting for the reduced frequency of use. Nonetheless, it is not possible to attribute lower urgent and emergent care use to the effect of the SBHC. Second, data were only available for urgent and emergent care visits within the CHN. It is possible that many of the adolescents in this study were using urgent and emergent care services outside of the network and there was no way to know that. Despite problems with the analysis of this question, there is a suggestion that these SBHCs are significantly influencing urgent and emergent care use by adolescents. Previous studies have demonstrated a positive effect on reducing urgent and emergent care use [17,22].

Although this study addresses the limitation of self-selection by having the three-group comparison, other limitations common to SBHC research exist. First, external validity of results of this study are questionable. These centers were not randomly selected and their experience may not reflect the experience of the larger field. Results of this study combined with those from the study by Kaplan and colleagues [17] provide strong evidence of the functioning of SBHCs in this community. Second, this study shares a degree of uncertainty about other services used by adolescents with most attempts to compare utilization. The study by Kaplan and colleagues [17] was able to minimize this problem by selecting an HMO population. In the case of this study, there is not necessarily a complete picture of where else adolescents may have been going for health and mental health services. Adolescents have been documented to rely on multiple sources of care, including medical specialists, reproductive health care, and other primary care sources [18]. They have

also reported identifying school as an important source of mental health services [18]. It is possible, for instance, that adolescents in this study, who had lower mental health visit rates in CHN facilities, were in schools with resources that were assisting them, although to a much lesser degree, in meeting this need. Limitations of using chart review for data collection are also a concern in this study. Measurement error related to reliability and validity could occur at the time of data extraction and continue into interpretation of the data. In the case of this study a specific issue was lack of reliability checks on data retrieval. There are research reports that document uneven reliability depending on the aspect of the visit being recorded [23,24]. There is some evidence that chart review may result in overreporting and underreporting of the quality of screening and counseling services actually delivered to the adolescent [18].

Concern about reporting of risk factors in this study is expressed in terms of underreporting of risk, especially in students not using SBHCs. The higher reported rate of risk factor identification in SBHCs may have been influenced by use of forms that prompted practitioners to screen and report risk. The use of forms prompting practitioners has been found to improve on provider compliance with screening and reporting [25].

The two models of care evaluated in this study were quite different in many respects. It is not possible to determine which of these differences had the strongest influence on outcomes. Variability in the models that may have influenced data collection as well as service provision include: degree of comprehensive health services offered in a single unit, availability of mental health services, reproductive health restrictions or a lack of them, parental consent or lack of it; knowledge and comfort of staff members with adolescents; transportation; availability during vacations and after hours care; and existence of fees. Specific information on variability within each site, especially the 11 community health centers, was not available and is not accounted for in this study. Finally, this study, as are most longitudinal studies, was challenged by mobility of the population. There are difficulties inherent in studying the dynamics of a phenomenon over time. There was movement across groups when students transferred schools or dropped out. This movement resulted in a shifting group of users whose school registration status had to be checked yearly and whose visits had to be analyzed yearly. This difficulty was accounted for by selecting a visit level unit of analysis; however,

the sacrifice led to limitations on the ability to analyze users.

Since the time that these data were collected, Medicaid managed care and the State Child Health Insurance Program (SCHIP) have been implemented in most states. Intended consequences of these programs, such as documenting and improving quality of care measures for the Medicaid population and removing the lack of insurance as a barrier to accessing care, have not been fully realized. The American Public Human Services Association's report on quality improvement data documenting the performance of Medicaid managed care plans concluded that scores related to adolescent well care were poor for both Medicaid and commercial insurance enrollees [26]. Since the enactment of the SCHIP program more adolescents have become insured; however, large numbers remain uninsured and eligibility issues prevent many from receiving services [27]. Details about SBHCs' role in managed care and the SCHIP program have been extremely difficult to work out. In many communities SBHCs are left out of the reimbursement chain. Concerns about duplication and cost persist, but it appears based on the results of this and other studies that, if school-based health centers are included in these programs, the result will be improved access to health and mental health services for adolescents. If this inclusion produces a more open access policy for adolescents with multiple points of service and increased costs, then determining that the outcomes are worth the cost would be the next policy question that needs to be answered. Financing this model may need to include a continued or expanded level of support from states or local communities as well as reimbursement for services from managed care and SCHIP.

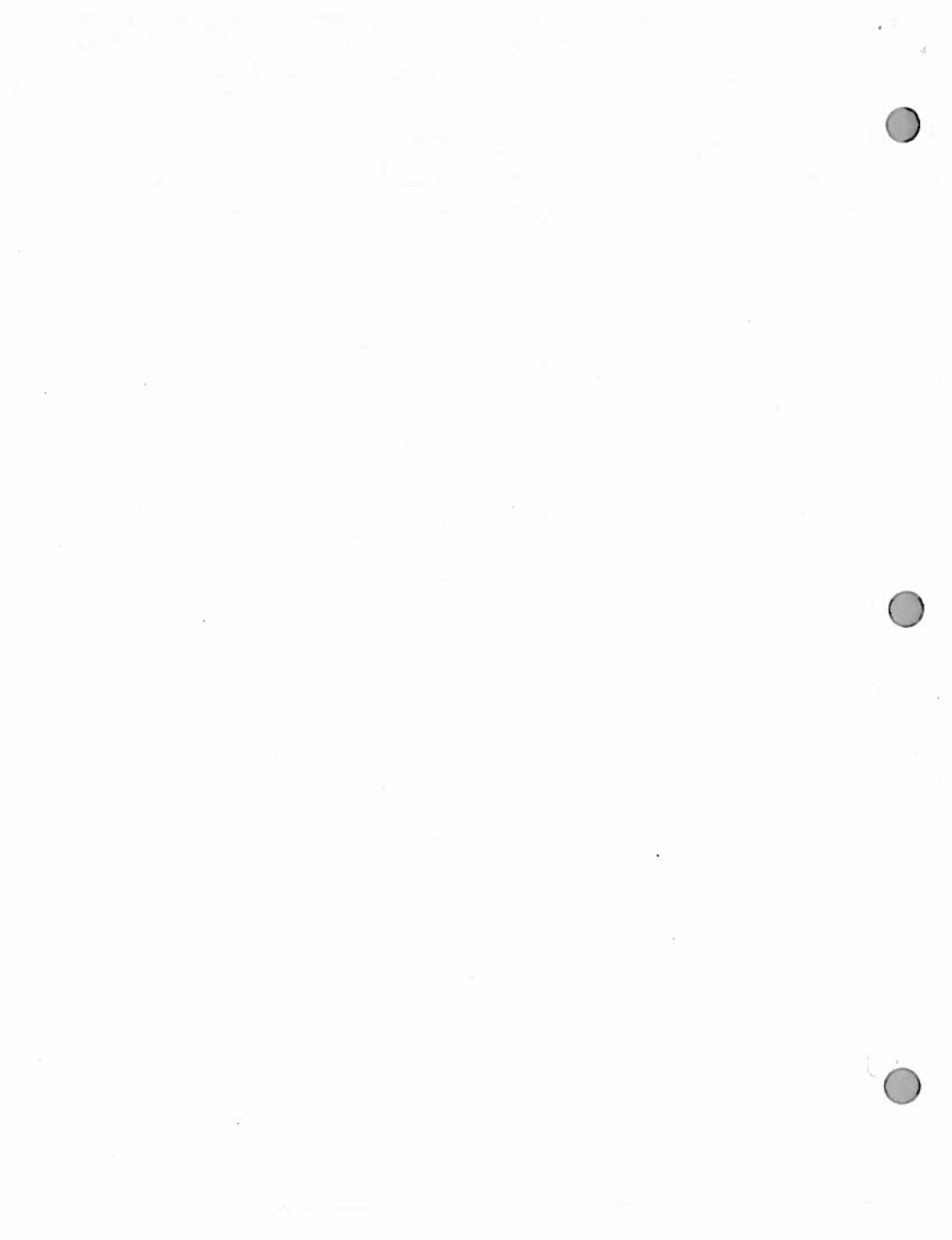
Despite limited generalizability and methodological challenges of utilization studies such as this, results of this study offer strong support for SBHCs providing increased access to health and mental health services for low-income adolescents and the opportunity to address their health needs. As experience in SBHCs increases, studies such as this of users and utilization provide strong support for the centers. This study reported how use at SBHCs compared with use at another service delivery model. It provides some compelling evidence that SBHCs do increase access to care for adolescents with higher visit rates than noted by national data, and that centers are making a significantly different contribution to the health of adolescents and one that is complementary to other services they might be receiving. More specifically, centers are doing a

better job of attracting populations whose health service use has been of concern and are doing an exceptional job of providing mental health services.

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Original article

Impact of School-Based Health Center Use on Academic Outcomes

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Abstract

Purpose: The purpose of this study was twofold: (1) to examine the effects of School-Based Health Center (SBHC) use on academic outcomes for high school students, using a well-controlled, longitudinal model, and (2) to examine whether SBHC medical and mental health service use differentially impacts academic outcomes.

Methods: Analyses used a latent variable growth curve modeling approach to examine longitudinal outcomes over five school semesters for ninth grade SBHC users and nonusers from Fall 2005 to Fall 2007 ($n = 2,306$). Propensity score analysis was used to control for self-selection factors in the SBHC user and nonuser groups.

Results: Results indicated a significant increase in attendance for SBHC medical users compared to nonusers. Grade point average increases over time were observed for mental health users compared to nonusers. Discipline incidents were not found to be associated with SBHC use.

Conclusions: SBHC use was associated with academic improvements over time for a high-risk group of users. The moderating effect of type of use (medical and mental health) reinforces the importance of looking at subgroups when determining the impact of SBHC use on outcomes. © 2009 Society for Adolescent Medicine. All rights reserved.

Keywords:

School-Based Health Center (SBHC); Academic; High risk; Youth; Longitudinal; Mental health; Medical; Attendance; GPA; Discipline; Propensity score

School-based health centers (SBHCs) operate in nearly 2,000 schools in the United States [1]. Typically providing some combination of primary health, immunization, reproductive, and mental health services, SBHCs are intended to improve availability of these services to children and youth who are traditionally underserved within community health and mental health settings [2]. SBHCs have been shown to increase access to care for high-risk groups, such as those living in high-poverty communities, those with no health insurance, and ethnic minority youth [3–9].

In addition to increasing access to health and mental health services, SBHC use is associated with improvements in physical and emotional outcomes including lower Medicaid-funded emergency room expenses [3,10,11].

Longitudinal analyses have established that SBHCs can improve student-reported health-related quality of life, with the highest impact among children with lower socioeconomic status, who might not otherwise receive care [10].

SBHC Impact on Academic Outcomes

The positive impact of SBHC use on important public health-related outcomes is well documented and is an important justification for the continued place of SBHCs within the public health system [3,11–14]. However, the increased political demand for academic accountability in school health services particularly heightens the need for well-controlled, longitudinal studies examining the specific academic impact of SBHC use [15]. Additionally, identifying potential differences in academic outcomes for subgroups of users can provide insight into the mechanisms through which SBHC use may impact academic outcomes.

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The research literature on SBHC use and academic outcomes is currently limited in quality and quantity because of (a) difficulties connecting school data and SBHC databases because of privacy laws, (b) limitations of self-report data for measuring academic outcomes, (c) inability to make conclusive causal statements because of cross-sectional data or limited follow up, and (d) the paucity of research studies that have employed control groups or well-controlled analyses [15]. A few studies have found a positive impact on attendance associated with SBHC use for samples of low-income, elementary age students [12], pregnant teens [16], and youth with psychosocial impairments [17]. In contrast, an early study by McCord, Klein, Foy, and Fothergill [18] found that use of SBHCs without regard to subgroup status had no impact on attendance or school discipline, but did have a positive impact on graduation rates, particularly among African American males.

A few studies have assessed outcomes related to student discipline for youth served by SBHCs. Jennings, Pearson, and Harris [19], in an uncontrolled examination of low-SES students referred to SBHCs for mental health services, found a 95% reduction in disciplinary referrals. Although additional studies of specific behavioral school programs (e.g., violence prevention) have found program use is associated with decreases in discipline-related events [20,21], other studies of less well-defined school-based interventions (e.g., generic “expanded school mental health” services), have found no impact on disciplinary actions [22].

Geierstanger and Amaral [15] have articulated a conceptual framework to explain the impact of SBHC use on educational indicators, including attendance, discipline, and grades. In their model, SBHC use impacts school behaviors and academic outcomes indirectly by influencing student resiliency, health status and health behaviors, and school-level effects. However, as discussed above, there are very few studies testing these assumptions through well-controlled research designs.

Objectives and Hypothesis

The present study examines the relationship between SBHC use and several indicators of academic achievement through a well-controlled, quasi-experimental longitudinal design using administrative data and propensity score matching to control for group differences at baseline. There were two goals for this study. The first goal was to examine SBHC service use as a predictor of academic outcomes, including attendance, discipline referrals, and grade point average (GPA). We hypothesized that use of SBHC services would have a positive impact on each of these outcomes. The second goal was to examine how the effects of SBHC use on academic outcomes vary across different services, specifically medical and mental health. Given the Geierstanger and Amaral [15] model of indirect effects, we hypothesized that medical use would have a positive relationship with

school attendance rates, and mental health use would have a positive relationship with attendance, discipline, and GPA.

Methods

Sample

The present study is a retrospective comparison of SBHC users and nonusers taken from a linked school district and SBHC database for all enrolled youth in the Seattle school district from September 2005 through January of 2008. Our study sample consisted of a cohort of ninth graders who began high school in September 2005 in one of 13 high schools with either an onsite SBHC or, in the case of three alternative high schools, access to a SBHC at a geographically proximal school. The linked school system–SBHC database included a wide array of information on demographics, school performance indicators and SBHC use. We received institutional review board approval for this study through the University of Washington.

Our study focused on ninth graders in order to control for previous SBHC use, as no student was able to access the high school SBHCs prior to the start of their ninth grade year. To select a user group consisting of youth who had same length of follow-up time from the first visit, we selected as users those youth who initiated contact with an SBHC in their first semester of ninth grade ($n = 444$). This strategy excluded youth who initiated SBHC use subsequent to the first Fall semester ($n = 993$), and the nonuser group included all youth who did not use during the study period ($n = 1,861$). Some demographic differences were found between the user, non-user, and excluded groups. The differences between the user and excluded groups must be considered in generalizing the results of our study to the larger SBHC population. The differences between the user and nonuser groups were controlled through a propensity score (described below). When compared to the excluded group, SBHC users demonstrated significantly lower GPA, lower attendance rates, higher discipline rates, more single parent or other guardianship, greater percentage of African American or Native American race, more likely to be free lunch eligible, and more likely to be female (Table 1).

Procedures

There are 14 SBHCs in Seattle, one in each of the district's 10 high schools and in four middle schools. Students at three of the district's alternative high schools also have access to SBHC services through centers located in nearby high schools. SBHCs in Seattle aim to provide preventive and primary health services with a staffing model that includes a nurse practitioner or physician's assistant, a masters-level mental health counselor, and a patient care coordinator.

Students are identified for mental health and medical services through routine risk assessment performed by healthcare providers, referrals from school intervention teams, targeted screening by school nurses, and self-referral.

Table 1
Descriptive information for SBHC users, nonusers and excluded users

| | | SBHC users: 05 | | Excluded users | | Non users | |
|--------------------------|---------------|----------------|-------------------|----------------|------------------|-----------|-------------------|
| | | n | % | n | % | n | % |
| Gender ^b | Female | 271 | 60.9 | 629 | 63.3 | 713 | 38.3 |
| | Male | 174 | 39.1 | 364 | 36.7 | 1148 | 61.7 |
| Ethnicity ^b | Asian | 63 | 14.2 | 227 | 22.9 | 490 | 26.3 |
| | Black | 180 | 40.4 | 251 | 25.6 | 363 | 19.5 |
| | Hispanic | 49 | 11 | 112 | 11.3 | 175 | 9.4 |
| | Native Am | 15 | 3.4 | 25 | 2.5 | 46 | 2.5 |
| | White | 138 | 31 | 375 | 37.8 | 787 | 42.3 |
| Free lunch ^{ab} | No | 245 | 55.1 | 664 | 66.9 | 1337 | 71.8 |
| | Yes | 200 | 44.9 | 329 | 33.1 | 524 | 28.2 |
| Living ^{ab} | Both parents | 182 | 40.9 | 551 | 55.5 | 1158 | 62.2 |
| | Single parent | 226 | 50.8 | 393 | 39.5 | 616 | 33.1 |
| Special Ed ^{ab} | No | 363 | 81.6 | 889 | 89.5 | 1660 | 89.2 |
| | Yes | 82 | 18.4 | 104 | 10.5 | 201 | 10.8 |
| ESL ^c | No | 416 | 93.4 | 920 | 92.7 | 1695 | 91.1 |
| | Yes | 29 | 6.5 | 73 | 7.4 | 168 | 8.9 |
| Fall 2005 | | n | mean \pm sd | n | mean \pm sd | n | mean \pm sd |
| GPA** | | 420 | 2.48 \pm .97 | 961 | 2.78 \pm .94 | 1683 | 2.88 \pm 1.01 |
| Attendance** | | 443 | 89.14 \pm 13.42 | 980 | 92.63 \pm 9.52 | 1805 | 90.31 \pm 16.96 |
| Discipline* | | 185 | 0.26 \pm .56 | 265 | 0.13 \pm .38 | 402 | 0.19 \pm .50 |

Notes. Significant tests included Pearson Chi-Square and Univariate ANOVA.

^a User group vs. excluded group, $p < .001$.

^b User group vs. nonuser group, $p < .001$.

^c User group vs. excluded group, User group vs. nonuser group, $p < .05$.

* $p < .05$; ** $p < .001$.

The mental health scope of services for individuals can include drop in, crisis intervention, individual counseling, family therapy, and pharmaceutical management. Individual counseling can include a range of therapeutic modalities best fitted to the youth's presenting issue and needs. Given the episodic nature of youth help-seeking in SBHC services, treatment is often crisis-oriented or supportive. During the study period, SBHC counselors received monthly consultation from doctoral-level psychologists, which included information on evidence-based strategies for mental health treatment.

A frequency analysis of the first five diagnoses assigned to the study participants revealed some common categories of treatment. For mental health users ($n = 108$), the most common reasons for a visit included academic difficulties ($n = 30$, 27.8%), family problems ($n = 24$, 22.2%), depressive disorders ($n = 14$, 13%), and deferred diagnosis ($n = 17$, 15.7%). Common medical visits ($n = 336$) included medical exam/health check up ($n = 162$, 48.2%), contraceptive counseling ($n = 39$; 12%), respiratory illness ($n = 35$, 10.4%), vaccinations ($n = 23$, 6.8%), and dietary/exercise issues ($n = 31$, 9.2%).

Measures

Apart from the academic outcome variables, all indicator variables were taken from the youth's status in the Fall of 2005. Variables included the youth's eligibility for federal free lunch status as an indicator of income, coded as 0/1.

Gender was coded for females = 1 and males = 2. Whether the youth was enrolled in special education was coded as 0/1. Family living situation was coded as three separate dichotomous variables for living with both parents, living with a single, biological parent, and another living situation. In the analyses, living with both parents is the reference variable and is not included in the regression. Ethnicity was coded into dichotomous variables for African American, Latino, white non-Latino, Native American, and Asian and Other. In the analyses, white, non-Latino is the reference variable and is not included in the regression. Receiving English as Second Language (ESL) services was coded as a 0/1 dichotomous variable.

GPA scores for the five semesters from Fall 2005 to the Fall 2007 were left in the analyses untransformed as the distribution did not exceed standards for normality as indicated by skew [23]. Further, exploratory transformations of the scores did not improve the distribution. Attendance percentage was a ratio of days present/or excused absences over days available. The attendance percentage scores were categorized, for each semester, into 10 equal groups based on percentiles because of negative skew. Discipline incidents was a count of suspensions and expulsions for each semester. This variable was categorized into three groups, 0 = *not present*, 1 = *one incident*, 2 = *two or more incidents*, because of the low frequency of more than two incidents in a semester.

We measured use similarly to an intent to treat analysis in which SBHC use was a dichotomous variable (0/1) based on

initiating treatment with no control for dosage. The modal number for both mental health and medical visits over the study period was 1. The mean number of mental health visits over the five semesters was 9.52 ($SD = 12.86$), with a range from 1 to 126. The mean number of medical visits was 5.36 ($SD = 6.99$), with a range from 1 to 73 visits. Mental health and medical service use was determined through the use of practitioner code. Medical services were defined as those services provided by a nurse practitioner, physician's assistant, or medical doctor; mental health services were those provided by a mental health counselor.

Analyses

Analyses used a latent variable curve growth modeling approach, using Mplus 4.2 [24] and full information maximum likelihood to account for missing data. The user and nonuser groups were statistically matched using a propensity score to control for user differences and self-selection factors [25]. The propensity score is sufficient for removing bias because of the observed covariates while controlling for multicollinearity by accounting for all the indicator variables in one score. The growth models included two latent constructs: an intercept variable representing the average academic score at the end of Fall 2005, and a growth (slope) factor representing the change in the academic score over the five semesters. Factor loadings at the intercept were set to 1, and the factor loadings of the semester points were set at 0, 1, 2, 3, and 4 to model a linear pattern, with the exception of the attendance analyses, which were run as a quadratic because of a dip in attendance in Winter 2007 and an increase in model fit with the quadratic factor. Growth models were constructed three times for each academic outcome, testing the differences in outcomes for (a) all SBHC users versus nonusers, (b) mental health SBHC users versus nonusers, and (c) medical SBHC users versus nonusers.

The propensity score used the probability score for each individual resulting from a logistic regression in which free

lunch status, gender, special education, living situation, ethnicity, and ESL status were entered as independent variables, with user status in the Fall of 2005 (0/1) as the dependent variable. The probability distribution was categorized into five equal groups based on percentiles. Five groups were created because of general standard practice given Cochran's [26] finding that five groups was sufficient for removing 90% of bias because of a single continuous covariate. To test the validity of the propensity model, we tested each covariate as a dependent in a two-way analysis of variance with user (0/1) and the propensity strata as independent variables [21]. None of the main effects or interaction effects was significant for user groups after the propensity strata were included in the analyses. Given that up to 5% of the tests can be significant and still fall within reasonable limits for accepting the propensity model [27], we conclude that our model adequately controlled for self-selection factors.

Results

Attendance

Overall student attendance remained fairly steady over the five semesters (semester averages = 90.1%, 88.1%, 89.3%, 86.4%, and 89.3%), with a noticeable dip in the fourth semester (Spring 2007). Table 2 describes the parameter estimates and correlations for users and outcomes. We used the quadratic LGM controlling for propensity score to test differences in users and nonusers in baseline and rate and curve of change over time for attendance; the raw scores over the five semesters are illustrated in Figure 1. For all types of SBHC users, users had lower attendance rates than nonusers at Fall 2007 ($\beta = -0.59, p < .001$). The slope and quadratic factors are significantly negative and positive, respectively, for use ($\beta = -0.27, p < .05$; $\beta = 0.06, p < .05$); this indicates that, initially, attendance rates dropped for SBHC users but over time increased at a greater rate than nonusers (Figure 1)

Table 2
Parameter estimates and correlations for SBHC use type and outcomes

| | Intercept | | | Slope | | | Quadratic | | |
|------------|-----------|-------|------|--------|-------|-------|-----------|-------|-----|
| | b | stdxy | r | b | stdxy | r | b | stdxy | r |
| Attendance | | | | | | | | | |
| All users | −0.59** | −.09 | −.18 | −0.27* | −0.07 | −0.04 | 0.06* | 0.08 | .06 |
| MH users | 1.37*** | −.12 | −.17 | −0.29 | −0.04 | −0.02 | 0.09 | 0.06 | .05 |
| Med users | −0.35* | −.05 | −.14 | −0.32* | 0.08 | −0.05 | 0.07* | 0.08 | .07 |
| GPA | | | | | | | | | |
| All users | −0.25*** | −.11 | −.17 | 0.03* | 0.09 | 0.08 | | | |
| MH users | −0.61*** | −.14 | −.18 | 0.06* | 0.09 | 0.09 | | | |
| Med users | −0.15* | −.06 | −.13 | 0.01 | 0.04 | 0.03 | | | |
| Discipline | | | | | | | | | |
| All users | 0.31** | .14 | | 0.03 | 0.05 | | | | |
| MH users | 0.42* | .01 | | 0.05 | 0.04 | | | | |
| Med users | 0.21* | .09 | | 0.03 | 0.04 | | | | |

Notes. b = raw parameter estimate, stdxy = standardized coefficient using latent and observed variable variances in the standardization. Discipline does not have correlation coefficients because the dependent variables were categorical rather than continuous. Significance levels based on standard errors of raw parameter estimates.

* $p < .05$; ** $p < .01$; *** $p < .001$.

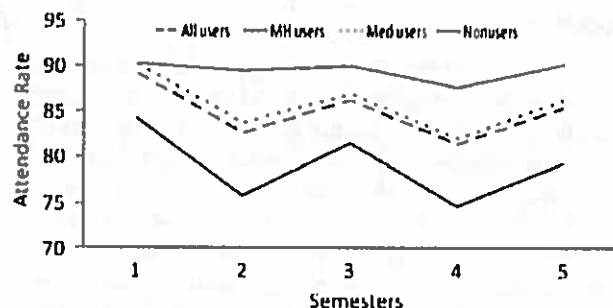


Figure 1. Change in attendance rates over five semesters for different user types.

(comparable fit index [CFI] = 0.99, root-mean-square error of approximation [RMSEA] = 0.05, standardized root-mean-square residual [SRMR] = 0.02).

In the mental health user model, the differences in Fall 2007 rates were similar, with mental users having lower attendance rates than nonusers ($\beta = -1.37, p < .0001$); however, although the quadratic trend was also similar, it did not reach significant levels (slope $\beta = -0.29, ns$; quadratic $\beta = 0.09, ns$) (CFI = 0.99, RMSEA = 0.04, SRMR = 0.02). Change was observed most strongly with the medical user group; again, the medical user group started with a lower attendance rate in Fall 2007 ($\beta = -0.35, p < .05$), saw a brief decline in rates compared to the nonuser group ($\beta = -0.32, p < .05$) and then an increase in attendance ($\beta = 0.07, p < .05$) relative to nonusers (CFI = 0.99, RMSEA = 0.05, SRMR = 0.02).

Discipline

Discipline incidents were low in the overall sample, with only 4.6% of the entire sample having had one or more discipline incidents by the end of the study period. Mean rates of discipline incidents were fairly stable over time, with a sharp increase in the second semester (Spring 2006) and then back to mean levels across the five semesters (0.05, 0.08, 0.05, 0.05, and 0.05). A linear, propensity controlled, LGM analysis for a categorical outcome, using a weighted least square parameter estimate (WLSMV) estimator, for all SBHC users versus nonusers found a significantly higher rate of discipline incidents for users ($\beta = 0.31, p < .001$), but no differences in change over time ($\beta = 0.03, ns$) when compared to nonusers (CFI = 1.00, RMSEA = 0.00, WRMR = 0.56). This relationship also held for mental health users with a higher rate at Fall 2007 ($\beta = 0.42, p < .05$) and no difference in change over time when compared to nonusers ($\beta = 0.05, ns$). The discipline rate for medical users was also higher than nonusers at baseline ($\beta = 0.21, p < .05$) and did not change over time ($\beta = 0.03, ns$).

GPA

Figure 2 summarizes the raw GPA outcomes over time for all users versus nonusers, and illustrates the overall increases in

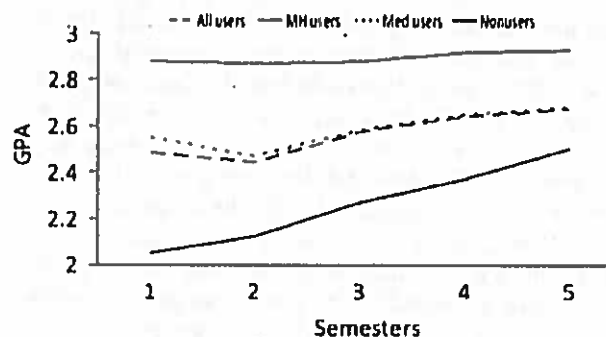


Figure 2. Change in GPA over five semesters for different user types.

GPA over time for both groups and the more rapid increase for SBHC users. In this model, a linear propensity controlled LGM analysis demonstrated that users had lower GPAs than nonusers in Fall 2005 ($\beta = -0.25, p < .001$), and use was predictive of GPA increases over time ($\beta = 0.03, p < .05$) (CFI = 0.99, RMSEA = 0.05, SRMR = 0.04). This same effect is even stronger when run for mental health users only. SBHC users receiving mental health services had significantly lower GPAs than nonusers at Fall 2005 ($\beta = -0.61, p < .0001$) and a steeper increase in GPA over the five semesters ($\beta = 0.06, p < .05$) (CFI = 0.99, RMSEA = 0.05, SRMR = 0.04). The effect was not observed when examining medical users alone, although the trend remained. Medical users had significantly lower GPAs at Fall 2005 ($\beta = -0.15, p < .05$), and use was not associated with significant increases in GPA over the five semesters when compared to nonusers ($\beta = 0.01, ns$) (CFI = 0.99, RMSEA = 0.05, SRMR = 0.04).

Discussion

One of the primary missions in the SBHC movement is reaching youth who are underserved by public and private healthcare systems, particularly those youth who are at risk for social and educational failures [28]. The purpose of this study was to examine the effects of general and specific SBHC use (medical and mental health use) on educational outcomes for high-risk high school students, using a well-controlled, longitudinal model. The results indicate that, with low to moderate effect sizes, SBHC use is significantly associated with GPA and attendance gains, and that these effects are moderated by type of use. We found medical use was most strongly associated with increases in attendance and mental health use was more strongly associated with increases in GPA.

Although we did not specifically test Geierstanger and Amal's [15] theory of indirect effects, the differential results across user groups indicate that distinct aspects of services provided by SBHCs may directly impact specific outcomes. For example, 10% of medical users in our sample were treated for a respiratory illness which may have otherwise interfered with their school attendance. Further, nearly one half of medical users were seen for general medical exams, which could be providing a preventative benefit in keeping

youth from developing problematic medical issues. This is consistent with previous research that has identified a link between SBHC use and decreased inpatient and emergency services [11,29]. Students who are receiving assistance related to their emotional and behavioral well-being may experience improvements that are directly related to their ability to succeed academically in the classroom (e.g., improved ability to focus, increased positive affect).

Our finding of differential effects for subgroups of SBHC users (medical vs. mental health) is also consistent with other studies [7,12], and lends support to the strategy of testing subgroup differences as a promising model for further SBHC research. For example, Geierstanger and Amaral [15] suggest that significant findings for attendance are often revealed in subgroup analyses, especially among groups with chronic conditions associated with high absenteeism such as asthma, depression and attention deficit hyperactivity disorder.

Contrary to at least one other published study [19], we did not find differences in disciplinary events because of SBHC use; however, our measure of discipline was a count of suspension and/or expulsions over the semester, and was thus not very sensitive to day-to-day referrals or classroom behaviors. Also, as other researchers have argued [22], it may be that discipline-related behaviors are not likely to be impacted by general health and mental health services that are not specifically targeting disruptive behaviors.

Limitations

The current study has several limitations. First, to construct a user group in which all youth had a similar follow up period, we selected youth who used in Fall 2005 and excluded youth who initiated their use after this point. The resulting group of youth was significantly more at risk and had greater academic difficulties as assessed in 2005. This is consistent with other research showing that youth referred to an SBHC early in their high school career tend to have more risk characteristics [29]. Consequently, conclusions drawn from our results should be limited to higher risk youth using SBHC services.

Second, we had no control for SBHC use in middle school or any control for prior and/or concurrent service use through other service providers. Without this control, there is the possibility that youth who were using SBHC services were also using other medical and/or mental health services that accounted for the positive change in academic outcomes. Although nearly half of the user sample was eligible for free lunch and thus likely uninsured, underinsured or publicly funded, we cannot completely rule out this possibility.

Finally, the study did not benefit from detailed information on the types of treatment received in health and mental health sessions. Without knowing what kinds of services were being provided under the rubric of mental health counseling, we are limited in our ability to discuss specific recommendations for SBHC service implementation.

Conclusions

Our study found that SBHC use is significantly associated with increases in attendance rates and GPA over time for a specific cohort of users, and that these effects are moderated by types of services used. These results support the theory that SBHC use indirectly impacts academic performance through improving health and emotional well-being. Additional longitudinal, well-controlled research with an integrated process evaluation on how academic outcomes are impacted by youth receiving assistance for specific concerns, particularly problem areas and diagnoses associated with impaired school performance, will add substantially to the literature.

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